

### **REMARKS/ARGUMENTS**

Claim 1 has been amended to clarify the function of the multistage amplifying means.

Reconsideration of the application is respectfully requested for the following reasons:

1. Rejection of claims 1 to 4 under 35 U.S.C. 103(a) over Ota (US patent No. 5,430,766) in view of Thorp (US patent No. 5,257,285)

This rejection is respectfully traversed on the grounds that the Ota and Thorp patents fail to disclose or suggest a burst mode optical receiver:

- a. in which a multistage amplifying means is included in the reference signal generator rather than in a pre-amplifier, for detecting a peak output value and comparing the output signal, as recited in claim 1 (instead, Ota fails to disclose any multistage amplifier, while the Thorp patent discloses a multistage amplifying means included in a pre-amplifier rather than a reference signal generating means, for adjusting a complex pole pair response);
- b. in which the differential amplifier 115 includes at least two identical amplifiers, e.g., N identical amplifiers, as recited in new claim 6;
- c. in which, due to the use of at least two identical amplifiers, an open loop gain of the peak detector 110 (i.e., the voltage reference circuit 110) is  $G^N$ , and respective turn-on voltage offsets  $V_{BE,116}$  and  $V_{BE,118}$  in

the transistors 116 and 118 can be reduced by  $(1+G^N)$  (specifically recited in new claim 5), resulting in greatly improved sensitivity of the receiver (as explained on page 10, lines 21-24 and page 13, lines 1-6);

- d. in which the multistage amplifying means reduces the turn-on voltage offsets, as recited in claim 1, generated from the transistors 116 and 118 included in the voltage reference circuit 110 (and supported by Fig. 3 and page 8, line 23 to page 9, line 9); and
- e. in which the optimum number of amplifiers included in the multistage amplifying means is determined by considering not only the open loop gain  $G$  but also the power dissipation, as recited in claim 4 and explained on page 13, lines 18-24)

In contrast, the Ota patent discloses a burst mode digital data receiver including a positive peak detector A1, a negative peak detector A2P and low pass filter A2N. In the Ota, there is no multistage amplifying means for compensating the turn-on voltage offsets of the voltage reference circuit (See Figs. 6 and 8).

Moreover, the Thorp patent discloses a transimpedance preamplifier and a receiver including the preamplifier but not in a reference signal generating means as claimed. It is true that Fig. 4 of Thorp shows a multistage amplifying means (A1 and A2), but the multistage amplifying means is included in transimpedance preamplifier circuit and clearly does not have the peak value detection and comparison function of the claimed multistage amplifying means. Instead, the multistage amplifier of Thorp has the function of determining the overall response of a receiver circuit by adjusting a

complex pole pair response (See col. 7, lines 31-40). That is, the preamplifier circuit 14 (which includes the multistage amplifying means) is provided to reduce the bandwidth from 1.6GHz to 1.12GHz (See col.4, lines 41-57). Furthermore, the Thorp patent does not disclose how to determine the optimum number N of the identical amplifiers included in the multistage amplifying means.

In contrast, the claimed multistage amplifying means, which is not located in the preamplifying unit 100 but in the voltage reference circuit 110, plays a very important role in the reference circuit because it reduces the turn-on voltage offsets by  $(1+G^N)$ , the offsets being generated from the transistors 116 and 118 which are included in the voltage reference circuit 110.

The voltage reference signal is expressed by following formula:

$$V_{ref} = V_o(dc) + \left\{ \left( \frac{G^N}{1+G^N} \right) \left( \frac{G}{1+G} \right) \frac{I_{IN} Z_T}{2} - \frac{V_{BE,116} + V_{BE,118}}{1+G^N} \right\}$$

Referring to the above equation, as N becomes bigger, the effect of offsets ( $V_{BE,116}$  and  $V_{BE,118}$ ) becomes smaller. Therefore, the reference signal  $V_{ref}$  can be exactly extracted by reducing the effect of the offsets (See currently amended claim 1).

Moreover, the optimum number N can be properly determined by considering not only the open loop gain G but also power dissipation (See page 13, lines 15-24; claim 4).

As the Examiner notes, the Thorp patent does teach a multistage amplifying means. However, the multistage amplifying means is not located in the voltage

reference circuit but located in the preamplifying unit. Even if the multistage amplifying means can reduce the offset of the preamplifying unit, it is not installed for reducing the offsets of the voltage reference circuit. Therefore, there is no function of exactly extracting the reference signal in the multistage amplifying means of the Thorp.

Since neither the Ota patent nor the Thorp patent, whether considered individually or in any reasonable combination discloses or suggests all of the features of the presently claimed invention, and since there is no possible motivation to combine the multistage amplifier of Thorp in the reference circuit of Ota because of the different manner in which the multistage pre-amplifier circuit of Thorp operates, it is respectfully submitted that neither the Ota nor Thorp could have suggested the claimed invention, and that the rejection under 35 USC 103(a) is therefore improper.

CONCLUSION

Applicants believe that this is a full and complete response to the Office Action. For the reasons discussed above, applicants now respectfully submit that all of the pending claims are in complete condition for allowance. Accordingly, it is respectfully requested that the Examiner's rejections be withdrawn; and that claims 1-6 be allowed in their present form.

Should the Examiner require or consider it advisable that the specification, claims an/or drawings be further amended or corrected in formal respects, in order to place the case in condition for final allowance, then it is respectfully requested that such amendment or correction be carried out by Examiner's Amendment and the case be passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

BACON & THOMAS, PLLC

A handwritten signature in black ink, appearing to read 'Bj Urcia', with a long horizontal flourish extending to the right.

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